

We claim:

1           1. A process for preparing a shell-type catalyst which comprises applying  
2 to a substantially nonporous inorganic support material having a BET surface area of  
3  $< 80 \text{ m}^2/\text{g}$ , a catalytically active outer shell of a suspension containing at least one  
4 water soluble noble metal compound and a substantially water insoluble coating  
5 compound, drying said suspension onto the support material, and activating said  
6 support material in a reducing gas stream at an elevated temperature.

1           2. The process of claim 1, wherein said support material is a granulate,  
2 or a molded article of glass, quartz, ceramic, silica, alumina, graphite, molded carbon,  
3 metal, or steatite.

1           3. The process of claim 1, wherein said support material is a molded  
2 article of at least one of  $\text{SiO}_2$  and  $\text{Al}_2\text{O}_3$ .

1           4. The process of claim 2, wherein said molded article is at least one of  
2 a hollow extrudate, solid extrudate, sphere, granule, tablet, and strand.

1           5. The process of claim 1, wherein the support material has a diameter  
2 of from about 0.5 mm to about 50 mm.

1           6. The process of claim 1 wherein the BET surface of said support  
2 material is  $< 10 \text{ m}^2/\text{g}$ .

1           7. The process of claim 1, wherein said substantially nonporous support  
2 material has a pore volume of  $< 0.5 \text{ ml/g}$ .

1                    8. The process of claim 1, wherein said substantially nonporous support  
2 material has a pore volume of  $< 0.1 \text{ ml/g}$ .

1                    9. The process of claim 1, wherein said support material has a  $\text{Fe}_2\text{O}_3$   
2 content of about  $< 0.5 \text{ \% wt.}$

1                    10. The process of claim 1, wherein said water soluble noble metal  
2 compound is at least one compound of Ru, Rh, Pd, Ag, Os, Ir, Pt, and Au.

1                    11. The process of claim 10, wherein said water soluble compound is at  
2 least one oxide, hydroxide, carbonate, halide, nitrate, salt of organic acid, and complex  
3 compounds of said noble metal.

1                    12. The process of claim 1, wherein said suspension contains about  
2  $> 1 \text{ \% wt.}$  aqueous solution of said water-soluble noble metal compound, calculated as  
3 the metal.

1                    13. The process of claim 1, wherein said suspension contains about  
2  $> 5 \text{ \% wt.}$  aqueous solution of said water-soluble noble metal compound, calculated as  
3 the metal.

1                    14. The process of claim 1, wherein at least  $0.01 \text{ \% wt.}$  of said noble  
2 metal compound, calculated as the metal, is soluble in water at  $30^\circ\text{C}$ .

1                    15. The process of claim 1, wherein said water insoluble coating  
2 material is a metal oxide, less than  $4 \text{ \% wt.}$  of which, calculated as the metal, is soluble  
3 in water at  $30^\circ\text{C}$ .

1 16. The process of claim 15, wherein said oxide is at least one of SiO<sub>2</sub>,  
2 Al<sub>2</sub>O<sub>3</sub>, TiO<sub>2</sub>, and ZrO<sub>2</sub>.

1 17. The process of claim 16, wherein the maximum average agglomerate  
2 size of said oxide is about 15 μm.

1 18. The process of claim 16, wherein the agglomerate size of said oxide  
2 is from about 3 μm to about 7 μm.

1 19. The process of claim 1, wherein the BET surface area of said  
2 support material is from about 50 m<sup>2</sup>/g to about 500 m<sup>2</sup>/g.

1 20. The process of claim 15, wherein the compacted density of said  
2 metal oxide is from about 10 g/ℓ to about 800 g/ℓ.

1 21. The process of claim 1, wherein the weight ratio of said water  
2 soluble noble metal compound to said water insoluble coating compound, calculated as  
3 metal, is from about 0.1:1 to about 5:1.

1 22. The process of claim 21, wherein the weight ratio of the noble  
2 metal compound to coating compound is between from about 0.5:1 and about 2:1.

1 23. The process of claim 1, wherein the weight ratio of the noble metal  
2 compound, calculated as the metal, to the total weight of shell-type catalyst is between  
3 from about 0.0001:1 and about 0.02:1.

1 24. The process of claim 1, wherein the weight ratio of the coating  
2 compound to the total weight of the shell-type catalyst and calculated as metal, is from  
3 about 0.0005:1 to about 0.04:1.

1                   25. The process of claim 1, wherein the thickness of the coating shell of  
2 the catalyst is from about 0.1  $\mu\text{m}$  to about 20  $\mu\text{m}$ .

1                   26. The process of claim 1, wherein the concentration of the water  
2 soluble noble metal component calculated as the metal, is from about 0.1 % wt. to  
3 about 1 % wt. based on the catalyst.

1                   27. The process of claim 1, wherein the concentration of the water  
2 insoluble coating component, calculated as the metal, is from about 0.05 % wt. to  
3 about 1 % wt. based on the catalyst.

1                   28. The process of claim 1, wherein said reducing gas stream contains  
2 hydrogen.

1                   29. The process of claim 1, wherein said suspension further comprises  
2 an adhesion promoter.

1                   30. The process of claim 29, wherein said adhesion promoter is water  
2 glass.

1                   31. The process of claim 26, wherein said suspension further comprises  
2 a doping compound.

1                   32. In a process for the removal of acetylene from hydrogen chloride  
2 gas formed in the oxychlorination of preparing vinyl chloride, the improvement which  
3 comprises hydrogenating the acetylene in said hydrogen chloride gas in the presence of  
4 a catalyst prepared by the process of claim 1.

33. A shell type catalyst when made by the process of claim 1.